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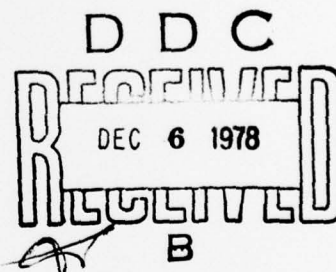
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**UNITED STATES ARMY
ENVIRONMENTAL HYGIENE
AGENCY**

ABERDEEN PROVING GROUND, MD 21010

PESTICIDE SPECIAL STUDY NO. 20-44-0933-79
INVESTIGATION OF POSSIBLE POLYCHLORINATED BIPHENYL (PCB) LEAKAGE
FROM ELECTRICAL TRANSFORMERS DUE TO STORM DAMAGE
WHITE SANDS MISSILE RANGE, NEW MEXICO



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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER 20-44-0933-79	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. REPORT NUMBER Pesticide Special Study No. 20-44-0933-79, Investigation of Possible Polychlorinated Biphenyl (PCB) Leakage from Electrical Transformers Due to Storm Damage, White Sands Missile Range, New Mexico, August 1978		5. TYPE OF REPORT & PERIOD COVERED Special Study August 1978
7. AUTHOR(s) Dr. J. Howard Vinopal		6. PERFORMING ORG. REPORT NUMBER 20-44-0933-79
9. PERFORMING ORGANIZATION NAME AND ADDRESS US Army Environmental Hygiene Agency Aberdeen Proving Ground, MD 21010		8. CONTRACT OR GRANT NUMBER(s)
11. CONTROLLING OFFICE NAME AND ADDRESS Commander US Army Health Services Command Fort Sam Houston, TX 78234		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 12. REPORT DATE August 1978
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		13. NUMBER OF PAGES 10
		15. SECURITY CLASS. (of this report) UNCLASSIFIED
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Polychlorinated Biphenyl Electrical Transformers Sediment Flood Soil Analysis Water Air		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Results of analyses of environmental samples (i.e., sediment, soil, water, air) collected in and around Bldg 1530, indicated that the flash flood at WSMR in August 1978 caused very little leakage (with no subsequent movement) of PCB's from transformers housed in the basement of Bldg 1530. Detectable levels of Aroclor 1260 (the specific PCB involved in this study) were noted only in a single sediment sample collected from transformer vault room 9A. The level of Aroclor 1260 (124 ppm) noted in the sample was below current EPA standards defining hazardous PCB spills or wastes. A summary of results, conclusions,		

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and recommendations were dispatched on 28 August 1978 via message, 281700Z Aug 78. Since PCB levels found in Bldg 1530 were not determined to be hazardous to human health, specific recommendations and corrective measures were not required.

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DEPARTMENT OF THE ARMY
U S ARMY ENVIRONMENTAL HYGIENE AGENCY
ABERDEEN PROVING GROUND, MARYLAND 21010

Dr. Vinopal/bb/584-2177

30 NOV 1978

HSE-RP-MO/WP

SUBJECT: Pesticide Special Study No. 20-44-0933-79, Investigation of Possible Polychlorinated Biphenyl (PCB) Leakage from Electrical Transformers Due to Storm Damage, White Sands Missile Range, New Mexico, August 1978

Commander
USA Materiel Development and
Readiness Command
ATTN: DRCSG
5001 Eisenhower Avenue
Alexandria, VA 22333

A summary of the pertinent findings and recommendations of the inclosed report follows:

a. Findings.

(1) Results of analyses of environmental samples (i.e., sediment, soil, water, air) collected in and around Building 1530, indicated that the flash flood at WSMR in August 1978 caused very little leakage (with no subsequent movement) of PCB's from transformers housed in the basement of Building 1530.

(2) Detectable levels of Aroclor 1260 (the specific PCB involved in this study) were noted only in a single sediment sample collected from transformer vault room 9A. The level of Aroclor 1260 (124 ppm) noted in the sample was below current EPA standards defining hazardous PCB spills or wastes.


b. Recommendations.

(1) A summary of results, conclusions, and recommendations were dispatched on 28 August 1978 via message, 281700Z Aug 78.

(2) Since PCB levels found in Building 1530 were not determined to be hazardous to human health, specific recommendations and corrective measures were not required.

FOR THE COMMANDER:

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DEPARTMENT OF THE ARMY
U. S. ARMY ENVIRONMENTAL HYGIENE AGENCY
ABERDEEN PROVING GROUND, MARYLAND 21010

PESTICIDE SPECIAL STUDY NO. 20-44-0933-79
INVESTIGATION OF POSSIBLE POLYCHLORINATED BIPHENYL (PCB) LEAKAGE
FROM ELECTRICAL TRANSFORMERS DUE TO STORM DAMAGE
WHITE SANDS MISSILE RANGE, NEW MEXICO
AUGUST 1978

1. AUTHORITY.

- a. AR 40-5, Health and Environment, 25 September 1974.
- b. AR 200-1, Environmental Protection and Enhancement, 20 January 1978.

2. REFERENCES.

- a. Message, 242043Z Aug 78, STEWS-BAFE-F, White Sands Missile Range, NM, subject: Request for Analysis of Samples Possibly Containing Polychlorinated Biphenyls (Askarels).
- b. Message, 281700Z Aug 78, HSE-RP, this Agency, subject as above.
- c. Message, 291730Z Aug 78, HSE-RP, this Agency, subject as above.

3. PURPOSE. To assess the extent and possible impact of leakage of PCB's (Askarels) from electrical transformers as a result of storm damage.

4. GENERAL.

a. Background.

(1) On 23 August 1978 a request was received by this Agency from WSMR for assistance in the analysis and evaluation of environmental samples for polychlorinated biphenyls (Askarels). Analysis of these environmental samples was requested in order to determine the extent and possible impact of leakage of PCB's from two electrical transformers located in Building 1530 at WSMR. Leakage of PCB's from the transformers was suspected as a result of extensive flash flooding which occurred in the basement of Building 1530 from rains received earlier in the week. Before the upper 1st and 2d floors of Building 1530 could be re-occupied and before a full-scale cleanup of the basement area could commence, a determination of the extent of PCB leakage and an evaluation of any resulting PCB health hazards were essential. Due to the important nature of WSMR operations performed in Building 1530, a timely determination as to whether or not the building could be safely re-occupied was urgently required.

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(2) The following types and numbers of environmental samples were collected from within and outside Building 1530:

(a) Seven sediment samples (soil from outside that was washed in during the flooding) from the two transformer vault rooms and other locations in the basement of Building 1530.

(b) Five soil samples collected outside Building 1530 from the general area where flood waters pumped from the basement were discharged.

(c) Three water samples from wells uphill and downhill from Building 1530 and from the tap within the building.

(d) Nine air samples collected from the two transformers vault rooms, other rooms located in the basement, 1st floor and 2d floor of Building 1530 and from a manhole behind Building 1530.

(3) In addition to the environmental samples described above, samples of the actual PCB transformer fluid (Askarel) from the transformers located in vault rooms 57A and 9A were also collected.

b. Sample Extraction and Cleanup.

(1) Air Samples. Due to an unavailability of Florisil®, air samples were collected on charcoal tubes. The charcoal tubes were extracted using a National Institute for Occupational Safety and Health (NIOSH) method designed for PCB extraction from Florisil tubes.¹ To increase detection limits, 2 ml of desorption solvent instead of the 5 ml described in the NIOSH method was used. The front portion and back portion of the charcoal tube were extracted separately. Three replicates each of charcoal tube spiked at 1 µg/tube and 5 µg/tube with Aroclor® 1260 were extracted and analyzed in the same manner as the WSMR air samples to determine PCB extraction efficiency from charcoal tubes. Results of these recovery studies are presented in Appendix A.

(2) Water Samples. The water samples were extracted using an EPA procedure designed for extraction and analysis of PCB's in industrial effluents.² Duplicate water samples (laboratory distilled water) spiked with

¹ NIOSH Manual of Analytical Methods, Vol 3, Second Edition, US Department of Health, Education, and Welfare, NIOSH, Cincinnati, OH, April 1977.

² Method for Polychlorinated Biphenyls (PCB's) in Industrial Effluents, MDQARL Environmental Protection Agency, Cincinnati, OH, 28 November 1973.

® Florisil is a registered trademark of Floridin Company, PO Box 989, Tallahassee, FL.

® Aroclor is a registered trademark of Monsanto Chemical Co., 800 N. Lindberg Boulevard, St Louis, MO.

Aroclor 1260 at the analytical detection limit of 0.8 ppb were extracted and analyzed in the same manner as the WSMR water samples. Results of these recovery studies are presented in Appendix A.

(3) Soil Samples. Extraction and cleanup procedures for the soil samples were essentially identical to those described in a previous report by this Agency.³ Florisil column elution with the 50 percent ethyl ether (petroleum ether mixture) was not carried out on WSMR soil samples since PCB's do not normally elute in this fraction.

(4) Sediment Samples. Two different extractions and cleanup procedures were employed with the sediment samples depending on the suspected levels of PCB's in the samples.

(a) Those sediment samples suspected as having only moderate levels of PCB's were subject to routine extraction and cleanup procedures which have been described in a previous USAEHA report.³

(b) Those sediment samples suspected of containing possible high levels of PCB's (i.e., samples from transformer vaults 57A and 9A and from areas immediately outside these vault rooms) were processed using a modification of the routine procedures cited in the above paragraph. After extraction of 150 g of sediment with 300 ml of hexane: acetone (3:1) mixture in the routine manner, 2 ml of extract (representing 1 g of sediment) rather than the usual 100 ml (representing 50 g of sediment), was carried through the Florisil column cleanup procedure. The above-described modifications in effect raised the PCB analytical detection limit fiftyfold.

(c) As is the case of the soil samples, a 50 percent ethyl ether/petroleum ether Florisil elution was not performed with any of the sediment samples.

(5) PCB Transformer Fluid. These samples were tested in the same manner as technical standards. Twenty milligrams of PCB transformer fluid was weighed into a 100 ml volumetric flask and diluted to volume with benzene. The solution was then serially diluted with isooctane to the approximate PCB electron-capture detection working range (i.e., 200 to 400 pg/ μ l).

c. Sample Analysis and Quantitation. PCB determinations and quantitations on all samples were made by gas-liquid chromatography using electron-capture detection. Instruments used, analysis parameters used, and quantitation techniques employed were basically similar to those described in a previous USAEHA report.³

³ Pesticide Monitoring Annual Report No. 44-0100-78, Department of the Army Pesticide Monitoring Program. Evaluation of Environmental Samples Collected in Calendar Year 1975. Natl. Tech. Inform. Serv. AD-A050 880, 1978, 38 pp.

5. RESULTS AND DISCUSSION.

a. Results of PCB analyses of samples collected from WSMR are shown in Appendix B. Analysis of the transformer fluid from transformers located in vault rooms 9A and 57A indicated that the fluid consisted of approximately 70 percent Aroclor 1260. Based on the analysis of the transformer fluid, it was evident that Aroclor 1260 was the specific PCB of concern in the investigation.

b. Appendix C gives the analytical limits of detectability for Aroclor 1260 in the environmental samples collected from WSMR. The relatively high limits of detectability for Aroclor 1260 in air (i.e., 100-200 $\mu\text{g}/\text{cm}^3$) are attributable to extremely poor (2 percent) recovery efficiency of this Aroclor from charcoal tubes.

c. Positive findings of Aroclor 1260 were noted in only one of the environmental samples analyzed. A sediment sample collected from transformer vault room 9A was the lone positive sample; the sample contained Aroclor 1260 at level of 124 ppm. A level of 124 ppm Aroclor 1260 in an environmental sample such as soil or sediment, although considerably above expected ambient environmental levels, is not considered by current EPA PCB standards to constitute a hazardous spill or waste problem.

d. Not unexpectedly, residues of the insecticides DDT and chlordane were noted in six of the sediment samples and three of the soil samples. The multiresidue methodology used for extraction, cleanup, and analysis of PCB's is also applicable for the determination of residues of a number of insecticides and their metabolites. The residues of p,p'-DDT (with its metabolite p,p'-DDE) and chlordane found in the basement sediment most likely resulted from the washing in of soil from the proximity of Building 1530 which had been previously treated with DDT and chlordane (possible for termite protection). The residues of DDT and chlordane noted in the sediment and soil samples were consistent with levels expected from usual pest management activities.

6. CONCLUSIONS.

a. Based on the results of analyses of the environmental samples collected in and around Building 1530, it can be concluded that the flash flood at WSMR fortunately caused very little leakage (with no subsequent movement) of Aroclor 1260 (the specific PCB involved in this study) from transformers housed in the basement of Building 1530.

b. Detectable levels of Aroclor 1260 were noted only in a single sediment sample collected from transformer vault room 9A. The level of Aroclor 1260 (124 ppm) noted in the sample was below current EPA standards defining hazardous PCB spills or wastes.

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7. RECOMMENDATIONS. A summary of analytical results, conclusions, and recommendations pertaining to the present study was dispatched on 28 August 1978 via reference message 2b.

a. Due to the lack of any significant positive findings regarding PCB leakage from transformers located in Building 1530, specific recommendations and corrective measures were not required. It was suggested as a matter of good practice that the PCB-contaminated sediment (124 ppm Aroclor 1260) from transformer vault room 9A be disposed of in the WSMR sanitary landfill.

b. In the event that the PCB transformer fluid from the transformer located in vault room 9A requires replacement, it is recommended that the Solid Waste Management Division of this Agency be contacted regarding proper disposal procedures for this material.

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APPENDIX A

RESULTS OF RECOVERY STUDIES FOR EVALUATION OF
EXTRACTION EFFICIENCY OF AROCLOR 1260 FROM
WATER AND AIR SAMPLES

Type of Sample	Fortification Level (Aroclor 1260)	Percent Recovery (Aroclor 1260)	
Water	0.8 ppb	Rep 1	95.3
		Rep 2	99.5
Air	1 µg/charcoal tube	Rep 1	2.0
		Rep 2	2.0
		Rep 3	2.0
	5 µg/charcoal tube	Rep 1	2.0
		Rep 2	2.0
		Rep 3	2.0

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APPENDIX B

RESULTS OF ANALYSIS OF SAMPLES COLLECTED
FROM WHITE SANDS MISSILE RANGE, NEW MEXICO

USAEHA Sample No.	WSMR Sample Description	Type of Sample	PCB's and/or Pesticides Detected and Their Concentration	
SP 2517	Sample #1, Transformer Vault Room 9A	Sediment	Aroclor 1260-124.34 ppm	
5P 2518	Sample #2, Area Immediately Outside Transformer Vault Room 9A	Sediment	p,p'-DDE - 0.84 ppm	chlordane - 2.68 ppm
5P 2519	Sample #3, Transformer Vault Room 57A	Sediment	p,p'-DDE - 0.52 ppm	chlordane - 1.66 ppm
5P 2520	Sample #4, Area Immediately Outside Transformer Vault Room 57A	Sediment	p,p'-DDE - 0.66 ppm	chlordane - 1.19 ppm
SP 2521	Sample #5, Basement Corridor Outside Room 15	Sediment	p,p'-DDE - 0.53 ppm	p,p'-DDT - 0.92 ppm chlordane - 2.99 ppm
SP 2522	Sample #6, Basement Corridor Outside Room 28A and B	Sediment	p,p'-DDE - 1.05 ppm	p,p'-DDT - 0.52 ppm chlordane - 3.00 ppm
SP 2523	Sample #7, Basement Corridor Outside Room 50	Sediment	p,p'-DDE - 0.70 ppm	p,p'-DDT - 0.48 ppm chlordane - 2.82 ppm
SP 2524	Sample #8, Outside Bldg 1530 where water from basement was pumped	Soil	None Detected	
SP 2525	Sample #9, Outside Bldg 1530 where water from basement was pumped	Soil	None Detected	
SP 2526	Sample #10, Outside Bldg 1530 where water from basement was pumped	Soil	p,p'-DDE - 0.18 ppm	p,p'-DDT - 0.14 ppm chlordane - 0.61 ppm
SP 2527	Sample #11, Outside Bldg 1530 where water from basement was pumped	Soil	p,p'-DDE - 0.02 ppm	p,p'-DDT - 0.04 ppm chlordane - 0.10 ppm

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USAEHA Sample No.	WSMR Sample Description	Type of Sample	PCB's and/or Pesticides Detected and Their Concentration	
SP 2528	Sample #12, Outside Bldg 1530 where water from basement was pumped	Soil	p,p'DDE -	0.37 ppm
			p,p'-DDT -	0.29 ppm
			chlordane -	0.53 ppm
SP 2529	Sample #1, Well 21, downhill from Bldg 1530	Water	None Detected	
SP 2530	Sample #2, Well Site, uphill from Bldg 1530	Water	None Detected	
SP 2531	Sample #3, Water Tap Inside Bldg 1530	Water	None Detected	
SP 2532	Transformer Fluid from Trans- former in vault room 9A	Transformer Fluid	Aroclor 1260 - approx. 70.0 %	
SP 2533	Transformer Fluid from Trans- former in vault room 57A	Transformer Fluid	Aroclor 1260 - approx. 70.0 %	
SP 2534	Sample #1, Basement Corridor Outside Room 15	Air	None Detected	
SP 2535	Sample #2, Basement Corridor Outside Room 50	Air	None Detected	
SP 2536	Sample #3, Basement Corridor Outside Room 28	Air	None Detected	
SP 2537	Sample #4, Transformer Vault Room 9A	Air	None Detected	
SP 2538	Sample #5, 1st Floor Corridor Outside Room 174	Air	None Detected	
SP 2539	Sample #6, 1st Floor Corridor Outside Room 118	Air	None Detected	
SP 2540	Sample #7, 2d Floor Corridor Outside Room 248	Air	None Detected	
SP 2541	Sample #8, Manhole Outside Back of Bldg 1530	Air	Invalid Sample (Collection tube not opened)	
SP 2542	Sample #9, Transformer Vault Room 57A	Air	None Detected	

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APPENDIX C

ANALYTICAL LIMITS OF DETECTABILITY FOR AROCLOR 1260
IN ENVIRONMENTAL SAMPLES COLLECTED FROM
WHITE SANDS MISSILE RANGE, NM

Type of Sample	Limit of Detectability
Air	100-200 $\mu\text{g}/\text{cm}^3$
Water	0.80 ppb
Soil	0.40 ppm
Sediment (routine procedure)	0.40 ppm
Sediment (modified procedure)	20.0 ppm

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APPENDIX D

ACKNOWLEDGEMENTS

The assistance and recommendations of the USAEHA personnel listed below in the preparation of this report is acknowledged:

CPT Jeremiah McCarthy, Water Quality Engineering Division

Mr. Stephen Kistner, Water Quality Engineering Division

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